

REMARKS/ARGUMENTS

In response to the Office Action dated October 19, 2005, claims 1, 5 and 12 are amended. Claims 1-15 are now active in this application. No new matter has been added.

REJECTION OF CLAIMS UNDER 35 U.S.C. § 102 AND § 103

I. Claims 1-3, 5-10 and 12-14 are rejected under 35 U.S.C. § 102(e) as being anticipated by Smith (USPN 6,500,378).

The factual determination of lack of novelty under 35 U.S.C. § 102 requires the identical disclosure in a single reference of each element of a claimed invention such that the identically claimed invention is placed into possession of one having ordinary skill in the art. *Helifix Ltd. v. Blok-Lok, Ltd.*, 208 F.3d 1339, 200 U.S. App. LEXIS 6300, 54 USPQ2d 1299 (Fed. Cir. 2000); *Electro Medical Systems S.A. v. Cooper Life Sciences, Inc.*, 34 F.3d 1048, 32 USPQ2d 1017 (Fed. Cir. 1994).

Smith (USPN 6,500,378) and Hagenau (USPN 6,051,179) disclose apparatus for forming a three dimensional object which are different from the present invention. However, to expedite prosecution, independent claims 1, 5 and 12 are amended on the basis of the description, “the photosensitive resist is removed by the depth in accordance with the cumulative quantity of light for each exposure region”, at lines 4 and 5 of page 12 of the present application.

In particular, amended independent claim 1 now recites, *inter alia*:

a controller for controlling tilt angles of said plurality of micromirrors to control a quantity of irradiation light for each of a group of irradiation regions on said photosensitive material among more than two levels and obtain an exposed depth of said photosensitive material at said each of said group of irradiation regions in accordance with a cumulative quantity of irradiation light emitted thereto, said group of irradiation regions corresponding to said plurality of micromirrors and being fixed onto said photosensitive material.

Amended independent claim 5 now recites, *inter alia*:

a controller for controlling said spatial light modulator in synchronization with a relative movement of said group of irradiation regions to control a cumulative quantity of irradiation light emitted to each of exposure regions defined on said photosensitive material among more than two levels while a plurality of irradiation regions pass said each of exposure regions, to obtain an exposed depth of said photosensitive material at said each of exposure regions in accordance with said cumulative quantity of irradiation light.

Finally, amended independent claim 12 now recites, *inter alia*:

a controller for controlling said light source unit in synchronization with a relative movement of said irradiation region to control a cumulative quantity of irradiation light for each of exposure regions defined on said photosensitive material among more than two levels and obtain an exposed depth of said photosensitive material at said each of exposure regions in accordance with said cumulative quantity of irradiation light.

In claims 5 and 12 “exposure regions” is recited (line 11 of claim 5 and line 10 of claim 12). Support for “exposure regions” is at page 9, lines 20 to 22 of the present application.

Smith discloses an apparatus which comprises a container 12 holding liquid resin 10, an energy source 8, a spatial light modulator (DMD) 4 and a computer control system 2 (column 6, lines 11 to 19). In the apparatus, the surface of the liquid resin 10 cures into a solid lamina with irradiation of light from the spatial light modulator 4 which is controlled by the computer control system 2 (column 6, lines 52 to 55 and column 7, lines 1 to 10). The elevator platform 16 in the container 12 is moved down from the surface and new liquid resin 10 is allowed to flow over the cured lamina so that a portion of this new liquid is, in turn, converted to a solid lamina by the spatial light modulator (column 7, lines 10 to 17). This process is continued until the entire three-dimensional part 14 is formed (column 7, lines 22 to 23). In this manner, in Smith, the

apparatus repeats the irradiation of light from the spatial light modulator 4 and movement of the cured lamina by the elevator platform 16 to form the model (via *stacking laminae of resin*).

In amended independent claims 1, 5 and 12, a photo-fabrication apparatus controls a quantity of irradiation light for each of a group of exposure regions (or fixed irradiation regions) on photosensitive material among more than two levels and obtains an exposed depth of the photosensitive material at each of the group of exposure regions in accordance with a cumulative quantity of irradiation light emitted thereto. Therefore, amended independent claims 1, 5 and 12 are patentable over Smith, as a 3D physical model is formed *without stacking laminae of resin*, which is the case in Smith.

As described above, the elevator platform 16 in Smith is used for *stacking laminae of resin*, which is far different from a mechanism for changing a distance between a position where luminous fluxes going toward the group of irradiation regions are focused and a surface of the photosensitive material, as recited in dependent claims 2, 9 and 13 where, as noted above, a 3D physical model is formed *without stacking laminae of resin*.

Since a structure to control the quantity of irradiation light for each exposure region (or fixed irradiation region) among more than two levels is not disclosed or suggested in Smith, contrary to what the Examiner asserts, the computer control system 2 in Smith cannot obtain a relation between a quantity of irradiation light for one exposure region on a photosensitive material and an exposed depth of the photosensitive material (see the inventions recited in claims 3, 10 and 14 of the present application).

In view of the above, the allowance of claims 1-3, 5-10 and 12-14, as amended, is respectfully solicited.

II Claims 4, 11 and 15 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Smith in view of Hagenau (USPN 6,051,179).

However, as claims 1-3, 5-10 and 12-14, as amended, are patentable over Smith, dependent claims 4, 11 and 15 are patentable over Smith also, even when considered in view of Hagenau.

Furthermore, Hagenau discloses a three-dimensional object producing apparatus which comprises a programmed computer 10 for generating cross-sectional patterns, a light source 12, a reflective spatial light modulator (SLM) 11, a photoresin 16 contained in a vat or reservoir 17, and a build support piston 15 (column 6, lines 8 to 19). Also in Hagenau, the apparatus repeats the irradiation of light from the spatial light modulator 11 and movement of the cured lamina by the build support piston 15 to form a model (column 12, lines 15 to 48).

As noted above, in amended independent claims 1, 5 and 12, a photo-fabrication apparatus controls a quantity of irradiation light for each of a group of exposure regions (or fixed irradiation regions of claim 1) on photosensitive material among more than two levels and obtains an exposed depth of the photosensitive material at each of the group of exposure regions in accordance with a cumulative quantity of irradiation light emitted thereto. Therefore, amended independent claims 1, 5 and 12 are far different from the apparatus/method disclosed in Hagenau in the point that a 3D physical model is formed *without stacking laminae of resin*. Also, the structure and the advantage of the present invention, described above, are not disclosed or suggested in Hagenau.

It is believed that the reason for the rejecting claims 4, 11 and 15 under section 2) of Office Action means the computer control system 2 in Smith can make the table indicating the relation between a quantity of irradiation light and an exposed depth of the photosensitive material when taking account of post process operator actions recommended from the scan information in step S31 of Fig. 5 of Hagenau (column 12, lines 53 to 57). However, Hagenau describes “removing or adding material”, “making programming” or “mechanical adjustments” as examples of the recommended actions (column 12, lines 55 to 57), and “removing or adding material” and “mechanical adjustments” have no relation with the exposed depth of the photosensitive material. Regarding “making programming”, since a model is formed with *stacking cured laminae of resin* in Hagenau, it is impossible to derive “making programming” relevant to the exposed depth of the photosensitive material. As described above, the idea to obtain an exposed depth of the photosensitive material at the each of the group of exposure regions (or fixed irradiation regions) in accordance with a cumulative quantity of irradiation light emitted thereto is **NOT** disclosed or suggested in either Smith or Hagenau. Therefore making the table, as recited in claims 4, 11 and 15, is not an obvious result of merely combining the disclosures of Smith and Hagenau.

CONCLUSION

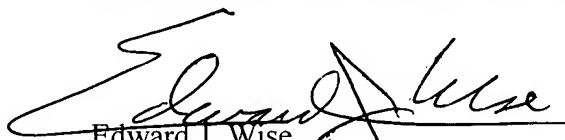
Accordingly, it is urged that the application, as now amended, is in condition for allowance, an indication of which is respectfully solicited. If there are any outstanding issues that might be resolved by an interview or an Examiner's amendment, Examiner is requested to call Applicants' attorney at the telephone number shown below.

Application No.: 10/759,134

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

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